ABSTRAK

Seiring dengan berjalannya waktu jumlah fluida yang terproduksi dari reservoir sumur minyak akan terus mengalami penurunan hingga pada titik dimana sumur minyak tidak dapat mengalir lagi secara alami. Sumur PDM-14 selesai di Bor pada September 2018 dan dengan data tekanan reservoir terakhir 2216 psi. Dengan tekanan Reservoir 2216 psi dan dengan Kadar air (KA) 71% sumur ini tidak lagi dapat berproduksi mengalir secara alami, maka dari itu dibutuhkan metode pengangkatan buatan untuk membantu agar sumur ini dapat berproduksi kembali. Dengan kondisi terbatasnya fasilitas dan dilihat dari data teknis sumur PDM-14 yang memiliki kedalaman 9938 ft, metode yang memungkinkan digunakan adalah *Electric Submersible Pump (ESP).* Untuk itu Dibutuhkan Perencanaan ESP sebagai dasar pertimbangan untuk pemasangan ESP disumur PDM-14. Perencanaan ESP meliputi Menghitung laju produksi optimal yang sesuai dengan metode *Inflow performance relationship* (IPR) 3 fasa, Perhitungan kedalaman *Submersible pump,* Penentuan kapasitas pompa, Perhitungan *Total dynamic head* (TDH), Perhitungan kebutuhan stage pompa, Perhitungan kebutuhan daya, dan perhitungan pendinginan motor, perhitungan *surface Voltage*, dan Perhitungan keekonomian pemasangan *Submersible Pump*. Dari perhitungan *Inflow Peformance Relationship* (IPR) didapat Laju Produksi Maksimal dari Sumur PDM-14 sebesar 616 bpd. Kapasitas Pompa/laju produksi optimal sebesar 369.6 bpd, dan ESP dipasang dikedalaman 8260.85 ft, dengan *Total dynamic head* (TDH) sebesar 7471.06 ft. Mempertimbangan Laju produksi Optimal dan TDH tadi maka dipilih ESP tipe REDA D460N dengan jumlah *stage* sebanyak 198 stage. Dengan Jumlah stage sejumlah itu dibutuhkan daya Sebesar 44 HP, sehingga dipilih Motor Seri 562 Dominator, 50 HP, 850 V, 43 A, pada Frekuensi 60 Hz. Hasil perhitungan pendinginan motor V= 0.459 ft/sec, nilai ini menunjukan pendinginan motor kurang baik sehingga dibutuhkan pemasangan *Shroud*. Sebagai dasar pemilihan Genset telah dilakukan perhitungan Kebutuhan KVA yaitu sebesar 79 KVA. Perhitungan keekonomian Pemasangan *Electric Submersible Pump* di sumur PDM-14 diperoleh *Net Present Value* (NPV) Sebesar Rp. 33.908.568.850, dengan *Rate of Investment* (ROI) 425%, dan *Pay Out Time* (POT) 0.235 tahun. Sehingga Pemasangan ESP di sumur PDM-14 sangat Ekonomis.

Kata Kunci: *Electric Submersible Pump*, Perancangan ESP, Keekonomian ESP

PLANNING ELECTRIC SUBMERSIBLE PUMP (ESP) IN WELL PDM-14 PT. PERTAMINA EP FIELD TAMBUN

ABSTRACT

Over time the amount of fluid produced from the oil well reservoir will continue to decrease to the point where the oil well cannot flow naturally anymore. The PDM-14 well was completed in Bor in September 2018 and with the last reservoir pressure data of 2216 psi. With a reservoir pressure of 2216 psi and with a water content (KA) 71% this well can no longer produce flowing naturally, therefore an artificial lifting method is needed to help so that this well can reproduce again. With the limited condition of the facility and seen from the PDM-14 well data which has a depth of 9938 ft, the possible method is Electric Electric Submersible Pump (ESP). For this reason ESP Design is needed as a basis for consideration for the installation of ESP along PDM-14. ESP planning includes calculating the optimal production rate according to the 3 phase Inflow performance relationship (IPR) method, Calculation of Submersible pump depth, Determination of pump capacity, Calculation of total dynamic head (TDH), Calculation of pump stage requirements, Calculation of power requirements, and calculation of motor cooling , surface voltage calculation, and economic calculation for Submersible Pump installation. From the calculation of Inflow Peformance Relationship (IPR), the maximum production rate of the PDM-14 well is 616 bpd. The optimum pump capacity / production rate is 369.6 bpd, and ESP is installed at a depth of 8260.85 ft, with a total dynamic head (TDH) of 7471.06 ft. Considering the Optimal and TDH production rates, ESP type REDA D460N was chosen with 198 stages. With that number of stages, it requires a power of 44 HP, so that the 562 Dominator Series Motor, 50 HP, 850 V, 43 A, are selected at Frequency 60 Hz. The results of the calculation of motor cooling V = 0.459 ft / sec, this value indicates that the cooling of the motor is not good so Shroud installation is needed. As a basis for the selection of Genset, the requirement for KVA has been calculated, which is 79 KVA. The economic calculation of the installation of Electric Submersible Pump at PDM-14 well obtained a Net Present Value (NPV) of Rp. 33,908,568,850, with a Rate of Investment (ROI) of 425%, and Pay Out Time (POT) of 0.235 years. So that the installation of ESP in PDM-14 wells is very economical.

Keywords: *Electric Submersible Pump, ESP Design, ESP Economy*